

AUTONOMIC INTEGRATION IN SCHIZOPHRENIA

BY

JOSEPH CYRUS RHEINGOLD

B. S., University of Illinois, 1927

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AN ABSTRACT OF A THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF DOCTOR OF PHILOSOPHY IN
PSYCHIATRY IN THE GRADUATE SCHOOL OF
THE UNIVERSITY OF ILLINOIS, 1941

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The present investigation is a "total-integration" study of a single psychotic subject. The method used is the "serial-section" technique together with psychiatric observation.

The Patient. The subject of the experiment was a man of 25 admitted to the Illinois Psychiatric Institute on June 4, 1937. His childhood was marked by frequent illness and convulsive seizures until the age of 12. He was a spoiled child; later, a withdrawn, irritable paranoid person who failed in all adjustments. His illness, which set in shortly before admission to the hospital, was characterized by stupefaction, queer acts and utterances and sense falsifications. The case was classified with the schizophrenias. He remained under observation until July 8, 1938. During this period the behavior was almost uniformly stuporous and at the end of the experiment he presented the status of a deteriorated case of catatonic schizophrenia.

The Method. The procedure consisted of daily observation of vegetative functions, clinical behavior, and the weather. The tests of the vegetative functions comprised determinations of temperature, pulse rate, respiratory rate, blood pressure, body weight, oxygen consumption, hydrogen-ion concentration and carbon-dioxide content of the venous blood, and absolute and differential leucocyte counts. The results were charted on a co-ordinate graph with individual ordinal scales and the common abscissa of time in days. To this chart was added a curve of the clinical course and a daily meteorogram. This graphic representation of the findings permits of easy study of correlation between the three sets of variables: body functions, behavior, and the weather. The results were also analyzed statistically. The first three months of the experiment constituted the Control Period. Thereafter the patient was subjected to treatment procedures in the following order: metrazol shock therapy, pitressin, insulin shock therapy, sodium citrate, pyrexia, metrazol shock therapy again, and, finally, metrazol intra-muscularly.

Control Period. During this period stupor was almost continuous and the weather relatively stable (summer months). The physiologic and chemical findings reflected a general state of hypometabolism with apparently greater than normal variability.

<u>Variable</u>	<u>Mean</u>	<u>Range of Variation</u>
Temperature	97.8	97.0-99.4
Pulse rate	67.5	52-90
Respiratory rate	20.5	16-28
Systolic B. P.	114	92-140
Diastolic B. P.	69	56-92
B. M. R. (0=100)	84.3	80.3-92.9
pH of blood	7.43	7.28-7.58
CO ₂ of blood	55.4	41-77
Absolute W. B. C.	6,945.	4,650-11,000
% Leucocytes	56.7	31-88
% Lymphocytes	38.7	11-68
Weight	126.2	122-129.5

Because of the uniformity of the behavior, no correlation can be sought between clinical status and the weather or the vegetative changes. In general, it may be said that stupor was associated with evidence of reduced levels of bodily activities. As for correlation between the vegetative changes and the weather, it is the opinion of Dr. William F. Petersen that the fluctuations in the day-to-day measurements were related to the cyclonic changes in the atmosphere and that the pattern of response of the organism was that typical of the normal leptosomic constitution.

"Metrazol" Period. Patient received 17 intravenous injections of 10% metrazol solution over a period of five weeks. All but three induced convulsions. Following the fourth injection the clinical condition improved rapidly and two days later reached the highest point on the clinical scale attained at any time. After a week of almost normal behavior, patient gradually relapsed and at the end of the period was as stuporous as he had been at the beginning. The onset of the improvement coincided with the fastigium of the second of two sharp polar inbreaks, following a two-week period of remarkably tranquil weather. Beginning with the appearance of clinical change the vegetative functions showed a definite swing in the direction of normal metabolism and sympathetic preponderance. These heightened levels were in general maintained until the end of the period. The mean determinations for the entire period are as follows:

<u>Variable</u>	<u>Mean</u>
Temperature	98.2
Pulse rate	80.2
Respiratory rate	22.3
Systolic B. P.	126
Diastolic B. P.	81
B. M. R. (0=100)	99.1
pH of blood	7.30
CO ₂ of blood	53.3
Absolute W. B. C.	9,282
% Leucocytes	69.9
% Lymphocytes	26.6
Weight	125.8

Comparison of this table with the mean determinations of the control period will reveal clearly the altered status of the organism. Whether this alteration was due solely to the effect of metrazol therapy or to the summation effect of metrazol therapy, stimulating weather conditions, and possibly, too, psychic influences, since the patient regarded the treatment as a form of punishment, cannot be ascertained. It is of interest that the behavior gradually returned to stupor despite the persistence of the altered vegetative status.

Other Treatment Periods. During the succeeding treatment periods the weather was unstable, the behavior varied little from stupor, and the metabolic levels sank to the pre-treatment status. Treatment produced only slight and short-lived clinical and autonomic changes. These treatment periods probably are not fair experiments, because the organism, exhausted by overstimulation in the metrazol period, may not have been able to respond to further stimulation.

CONCLUSIONS

1. A patient suffering of a psychosis diagnosed as schizophrenia was subjected to a battery of physiologic and chemical tests administered daily over a period of 13 months, first under resting conditions and then under the stress of various treatment procedures. Concomitant observations of the behavior and of the weather were made.

2. During the initial period the clinical status of stupor was associated with the vegetative status of hypometabolism. The range of variation of the several functions appears to exceed the normal. The organism responded to meteorologic changes in the way characteristic of the normal leptosome. These three findings may be said to define the autonomic integration patterns or the homeostasis organization of this schizophrenic subject.

3. The period of metrazol shock therapy was marked by the coincident appearance of improved social adjustment and a rise in the metabolic levels. The altered metabolic status persisted but the clinical conditions returned to stupor.

4. During succeeding treatment periods the behavior remained stuporous and the organism regressed into the pre-treatment hypometabolic status.

5. The most noteworthy finding of the experiment is the association of stupor and hypometabolism in the control period and the association of clinical improvement and normal metabolic levels in the first part of the "metrazol" period.

VITA

Born in New York City, on October 5, 1903. Secondary education in Chicago. College education at Crane Junior College, Chicago, University of Chicago, and Columbia University. Medical education at University of Illinois. B. S. degree, 1927; M. S. and M. D. degrees, 1930; all conferred by the University of Illinois. Professional experience includes the positions of Resident in the Illinois Psychiatric Institute, Clinical and Research Psychiatrist in the Memorial Foundation for Neuro-endocrine Research, and Resident in the Boston Psychopathic Hospital. Since 1934 in private practice of psychiatry and neurology. Associate, Department of Psychiatry, University of Illinois College of Medicine; Research Associate, Department of Neuropsychiatry, Michael Reese Hospital, Chicago. Diplomate in Psychiatry and Neurology of American Board of Psychiatry and Neurology. Member of Phi Beta Kappa, Alpha Omega Alpha, Sigma Xi. Publications: 1) The Effect of Feeding upon the Rate of Removal of *Bacillus Prodigiosus* from the Blood of Dogs; 2) The Hemato-encephalic Barrier in Schizophrenia; and 3) Autonomic Integration in Schizophrenia.



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